## AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

## **Listing of Claims:**

Claims 1-23 (canceled)

- 24. (currently amended) A system for determining the instantaneous amplitude (a) and phase (φ) of an analog sinusoid comprising:
- a vibratory sensor which produces said analog sinusoid output in response to the measurement of a parameter;

an analog-to-digital converter which receives said analog sinusoid from the sensor and converts said analog sinusoid to a digital sinusoid to form the in-phase component (I) of said sinusoid;

a Hilbert transformer approximation device which receives said digital sinusoid and produces the quadrature component (Q) of said digital sinusoid by introducing a phase shift to said digital sinusoid; and

## a Coordinate Rotation Digital Computer (CORDIC) comprising:

an amplitude computation device which receives said in-phase (I) and quadrature (Q) components and computes the instantaneous amplitude (a) of said digital sinusoid by processing said in-phase (I) and quadrature (Q) components according to the equation  $a = \sqrt{(Q^2 + I^2)}$ ; and

a phase computation device which receives said in-phase (I) and quadrature (Q)

components and computes the instantaneous phase ( $\varphi$ ) of said digital sinusoid by processing said in-phase (I) and quadrature (Q) components according to the equation  $\varphi = \tan^{-1}(Q/I)$ .

- 25. (original) The system of claim 24 wherein said Hilbert transformer approximation device further introduces a predetermined delay into said quadrature component (Q).
- 26. (original) The system of claim 25 further comprising a delay device which introduces said predetermined delay into said in-phase component (I).

Claims 27-35 (canceled)

- 36. (currently amended) A method of determining the amplitude (a) and phase ( $\phi$ ) of a sinusoid comprising:
  - A. measuring a parameter of an object with a vibratory sensor;
  - B. generating an analog sinusoid representative of said parameter;
  - C. digitizing said analog sinusoid to produce a digital sinusoid;
  - D. filtering said digital sinusoid to attenuate out-of-band noise in said digital sinusoid;
- E. introducing a delay into said digital sinusoid to produce an in-phase signal (I) associated with said digital sinusoid;
- F. performing a Hilbert transform approximation of said digital sinusoid to introduce a phase shift plus delay into said digital sinusoid, thereby producing a quadrature signal (Q) associated with said digital sinusoid;
- G. processing, with a Coordinate Rotation Digital Computer (CORDIC), said in-phase (I) and quadrature (Q) signals to compute said amplitude (a) of said digital sinusoid by applying

according to the equation  $a = \sqrt{(Q^2 + I^2)}$ ; and

H. processing, with said CORDIC, said in-phase (I) and quadrature (Q) signals to compute said phase ( $\phi$ ) of said digital sinusoid by applying according to the equation  $\phi = \tan^{-1}(Q/I)$ .

37. (currently amended) The method of claim 36 wherein said <u>vibratory</u> sensor comprises one of an accelerometer, a gyroscope, <u>and</u> a microphone, <u>a vibration sensor and a chemical</u> sensor.

Claims 38-40 (canceled)

41. (New) A system for determining the instantaneous amplitude (a) and phase ( $\varphi$ ) of an output analog sinusoidal signal comprising:

a vibratory sensor which produces said output analog sinusoidal signal characterized by an instantaneous phase and amplitude in response to the measurement of a parameter;

an analog-to-digital converter which receives said output analog sinusoidal signal from the vibratory sensor and converts said output analog sinusoidal signal to a digital sinusoid to form the in-phase component (I) of said sinusoid;

a Hilbert transformer approximation device which receives said digital sinusoid and produces the quadrature component (Q) of said digital sinusoid by introducing a phase shift to said digital sinusoid; and

a Coordinate Rotation Digital Computer (CORDIC) comprising:

an amplitude computation device which receives said in-phase (I) and quadrature (Q) components and computes the instantaneous amplitude (a) of said digital sinusoid by processing said in-phase (I) and quadrature (Q) components according to the

equation 
$$a = \sqrt{(Q^2 + I^2)}$$
; and

a phase computation device which receives said in-phase (I) and quadrature (Q) components and computes the instantaneous phase ( $\varphi$ ) of said digital sinusoid by processing said in-phase (I) and quadrature (Q) components according to the equation  $\varphi = \tan^{-1}(Q/I)$ .

- 42. (New) A method of determining the amplitude (a) and phase (φ) of a sinusoid comprising:
  - A. measuring a parameter of an object with a vibratory sensor;
- B. generating an output analog sinusoidal signal characterized by an instantaneous phase and amplitude representative of said parameter;
  - C. digitizing said output analog sinusoidal signal to produce a digital sinusoid;
  - D. filtering said digital sinusoid to attenuate out-of-band noise in said digital sinusoid:
- E. introducing a delay into said digital sinusoid to produce an in-phase signal (I) associated with said digital sinusoid;
- F. performing a Hilbert transform approximation of said digital sinusoid to introduce a phase shift plus delay into said digital sinusoid, thereby producing a quadrature signal (Q) associated with said digital sinusoid;
- G. processing, with a Coordinate Rotation Digital Computer (CORDIC), said in-phase (I) and quadrature (Q) signals to compute said amplitude (a) of said digital sinusoid by applying the equation  $a = \sqrt{(Q^2 + I^2)}$ ; and
- H. processing said in-phase (I) and quadrature (Q) signals to compute said phase ( $\varphi$ ) of said digital sinusoid by applying the equation  $\varphi = \tan^{-1}(Q/I)$ .